potential flood damages on Guadalupe River Coyote Creek and adjacent streams

Santa Clara Valley Water District

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REPORT ON

POTENTIAL FLOOD DAMAGES ON GUADALUPE RIVER COYOTE CREEK AND ADJACENT STREAMS

Prepared by

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in cooperation with the

Santa Clara Valley Water District

for the

U. S. Army Engineer District

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San Francisco

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POTENTIAL FLOOD DAMAGES ON GUADALUPE RIVER, COYOTE CREEK AND ADJACENT STREAMS

Description of Reaches - Standard Project and 100-year Floods

Four reaches are used in the analysis of potential damage due to flooding by the Guadalupe River, Coyote Creek and Adjacent Streams. These reaches are designated #1, #2, #3 and #4 and are shown on the enclosed maps for the Standard Project Flood Fig. 1 and 1A and the 100-year flood, Fig. 2 and 2A.

The maps show the estimated peak overbank flow in cfs and the depth of flooding in areas subject to inundation due to overbanking. These maps were prepared by the Santa Clara Valley Water District from information developed from the U. S. Army Corps of Engineers Floodplain Information Reports on the Guadalupe River, Coyote Creek and Fisher Creek.

Reach #1, Standard Project Flood

Reach #1 begins on Coyote Creek at Anderson Dam, River Mile 42 on Coyote Creek, and proceeding downstream includes overflows and streambed erosion on Coyote Creek from River Mile 42 to River Mile 31 in the vicinity of Tennant Road.

Overbanking and resultant overland flow, up to 5,000 cfs, occur almost immediately downstream of the Anderson Reservoir spillway at River Mile 41. These flood waters break across Monterey Road and the Southern Pacific Railroad tracks to join with the flood waters of Fisher Creek resulting in large scale inundation of this valley. These combined flows continued northward and rejoin the main Coyote Creek flows at River Mile 33 just upstream of Metcalf Road where the valley constricts between Tulare Hill and the foothills to the east.

At River Mile 32 on the Coyote, flood flows in Reach #1 again overbank Coyote Creek and flood waters, up to about 8,000 cfs, flow overland in a northwesterly direction to inundate Canoas Creek and adjacent areas. This downstream Reach #1 also includes a second overbanking of the Coyote Creek near Blossom Hill, Cottle and Monterey Roads which proceeds westerly to join the above-mentioned Coyote Creek overflow near the intersection of Blossom Hill and Snell Roads. From this point the total flow, with a peak of 12,000 to 14,000 cfs flows northwesterly cross country to River Mile 17 on the Guadalupe River near Hillsdale Avenue.

Reach #1 includes agricultural lands near Anderson Dam and on both sides of Monterey Road. Between Monterey Road and River Mile 17 on the Guadalupe River, there is an extensive residential development especially between Blossom Hill Road and Santa Teresa Boulevard. Major structural damages are inflicted on an estimated 240 residences in the path of the peak overland flood flows. This is in addition to damages to a much larger number, due to standing water. The International Business Machines' Plant and the recently completed St. Teresa Community Hospital and Medical Center are located in this reach and are subject to partial inundation.

Reach #2, Standard Project Flood

Reach #2 follows the Coyote Creek from River Mile 31 to about River Mile 15 at the Nimitz Freeway overpass. Due to proximity to Coyote Creek banks, 16 homes in this reach would suffer major structural damage from high velocity flood water. Bridges at the following crossings would be heavily damaged and require replacement: Story Road, East William and Santa Clara Streets, Western Pacific Railroad and San Antonio and Julian Streets.

Reach #3, Standard Project Flood

Reach #3 starts at River Mile 19 on the Guadalupe River and extends downstream to Highway 17. In addition to Guadalupe River flood flows, it includes the overbank flood waters from the Coyote Creek and flooding on Los Gatos Creek upstream from its confluence with the Guadalupe River.

Reach #3 includes some 5,000 acres of land through the center of San Jose which are inundated by overland flow. Combined overland waters from the Guadalupe River and Coyote Creek flow in two major floodplains which meander on both sides of First Street through the center of downtown San Jose in a flood path about two miles wide. Extensive residential, commercial, industrial and public buildings and facilities are subject to flood and water damage in Reach #3.

Reach #4, Standard Project Flood

Reach #4 includes all of the floodplain lying between

Highway 17, Nimitz Freeway and San Francisco Bay. There are substantial commercial and industrial developments as well as residential areas in Reach #4. The bayward portion is occupied by extensive salt production ponds and facilities. All or part of the San Jose Airport, the U. S. Naval Air Station, Moffett Field, Lockheed's Missiles and Space Facilities, the Community of Alviso, the San Jose-Santa Clara Water Quality Control Plant, and the State of California's East and West Agnew Hospital facilities are in this reach.

Reach #1, 100-year Flood

The same general area covered by Reach #1, described under Standard Project Flood, is included in this reach but the acreage subject to flooding is reduced, and water depths are less.

Reach #2, 100-year Flood

This reach is almost identical with that of the Standard Project Flood. The same miles of stream are involved, but the severity of flow and the amount of overtopping of banks is less.

Reach #3, 100-year Flood

Reach #3, 100-year flood, covers the same general area as Reach #3, Standard Project Flood, but is significantly smaller in flooded area and shallower water depths. A major factor in the reduced flow and lesser depths is the reduced overland flow from Coyote Creek. In Reach #3 of the 100-year flood, there is only a single swath of flood flow through downtown San Jose as contracted to the two pronged flow of the Standard Project Flood.

Acreage subject to flooding is only about one-fifth as great, and damages about one-sixth as great as in the Standard Project Flood.

Reach #4, 100-year Flood

The same general area is covered, however there is less involvement near the Highway 17-Nimitz Freeway crossover of U. S. Highway 101. In the bayfront area, Alviso and beyond, water depths are similar to those of the Standard Project Flood, partially due to the tidal effect.

Procedure

A majority of the floodplain is located in Santa Clara County. Assessor's maps for the County were secured for the inundated areas and assessed values were secured, in the form of computer printouts, for these areas. Value data was also obtained for unsecured properties. Assessor data for utilities were explored but when it was found, in the field, that there was little involvement, average values and damages were assigned. When there were major structures and facilities subject to damages such as water quality control plants, pumping stations, power lines, or substations, specific damages were estimated by the engineering staff in terms of current replacement costs.

Assessor's maps were marked with depth contour lines as a step in the analysis. These maps are a part of the file material. From the Assessor's secured roll, tables were prepared which listed each parcel shown on the property maps. Assessed values for land, improvements and personal property were entered for each parcel by book, page and parcel number. From separate Assessor's rolls the value of unsecured personal property was obtained and added to the values found in the secured rolls.

Field surveyors canvassed most of the floodplain areas of the Guadalupe River and Coyote Creek located in Santa Clara County. While coverage was not 100 percent, it was comprehensive rather than on a sampling basis. In the canvas, notations were made as to the type of structure, if any, on each parcel, the street address and the estimated elevation of the first floor above the crown of the street.

Flood depth data based on field information were entered on the tables of parcels described above. Flood damages were, calculated in terms of the depth of water above the first floor in residences. Where there were basement living quarters, an allowance was made for such flooding. Damages to non-residential properties, such as commercial and industrial areas, were estimated by use of a table of average damages per $1,000 of market value, again based upon water depths above the crown of the adjoining street. The estimated dollar damages per $1,000 of market value, were based upon the Stanford Research Institute (SRI) Publication, "A Study of Procedure in Estimating Flood Damage to Residential and Commercial and Industrial Properties in California". This study relates historical flood damages to water depths. Tabular values from the Stanford Research Institute publication are summarized in the Appendix.

For flood damages to other forms of development, such as public buildings, public utilities, streambeds and bridges, and freeways, specific estimates were prepared. Minor damages to facilities, such as streets and sidewalks, were based on calculated or assigned per acre averages. That is, data for the most comparable situations, where assessed values were available and Stanford Research Institute tables were applicable, were used to arrive at estimated values and damages. Damages to agricultural lands and improvements were estimated in terms of water depths and losses per acre ranged from a $100 to $500 per inundated acre.

Conversion of Values and Damage to Acres

Although coverage was close to 100 percent in some areas and figures developed for such areas could stand alone and be representative, it was found necessary that average values and average damages be developed on a per acre basis to give full coverage to the entire floodplain. This was the methodology applied; for example, to the floodplain areas in Alameda County which were not canvassed, but which could be classed as to use and water depths from area maps.

Conversion of values and damages to acres by use and water depths was necessary in order that findings could be generalized. Even with shortcuts, this effort required many thousands of calculations of parcel sizes, the allocation of land areas to major uses and the computation of average values per acre, and flood damages by water depth contour lines. It is believed the effort was worthwhile and that the results of the calculations contribute to the validity of the damage estimates presented in the report.

Summary

Flood damages in the floodplain of the Guadalupe River and adjacent streams under standard project flood conditions are estimated at $103,090,000. These potential damages are based upon January 1974 market values and replacement costs. This dollar estimate is based upon detailed study of some 37,881 acres and of properties valued at about $2,362,529,000. Aggregate damages represent about 4.36 percent of total property value. Standard Project Flood data are summarized in Table 1.

Comparable damages for floods with 100-year frequencies, are $50,633,000. A total of 26,474 acres would be flooded by a 100-year flood and property valued at $1,246,765,000 would be directly involved. Total damages would equal about 4.06 percent of total value. These data are summarized in Table 2.

Comments

Damages figures in both calculations are limited to the areas flooded and to the acreage and values estimated as subject to flooding. If a more precise calculation is made of acres subject to flooding, and the figures are smaller or larger than those cited here, appropriate adjustments would be needed. If the differences in totals are generalized, it is recommended upward or downward adjustments be made on the basis of averages developed in the analysis. If specific areas are added or subtracted, adjustments should be made for such changes on the basis of backup materials in the files and by any other pertinent information available as to the areas involved.

No allowance is made in the figures for disruption of traffic flow and loss of vehicles in the general area due to flooding of streets and major highways. Allowance is made, however, for cleanup and rehabilitation of residential streets subject to flooding. No allowance is made in the estimates for problems encountered by residents whose homes or places of business, while not in the areas actually flooded, are cut off from the surrounding areas by flood waters. There are several major areas of this sort within the floodplain. Two of the most notable are the Blossom Hill area between Blossom Hill and Santa Teresa Boulevard in Reach #1, and downtown San Jose on either side of First Street in Reach #3.

Requests have been made to major firms with industrial and transportation facilities, that are subject to possible inundation, for factual data as to the impact of flooding on offsite facilities and the total payroll impact which flooding would cause to the firm. This information will be included when received from the respective firms and companies.

APPENDIX

Source: A Study of Procedure in Estimating Flood Damage to Residential, Commercial and Industrial Properties in California, Stanford Research Institute, Menlo Park, California, January, 1960.

Residential Damages Table

Total Dollar Damage Per $1,000 Market Value of Structure at Inside Water Depths of Residences

Depth Above Floor Level	Damages Per $1,000 of Structures
.0	$ 40
.5	80
1.0	125
1.5	165
2.0	205
2.5	245
3.0 and more	285

Commercial and Insutrial Damages Table

Total Damage Per $1,000 of Market Value of Structure and Contents and Establishments

Depth Above Street Crown	Damages Per $1,000 of Structures and Contents
.0	$ 12
.5	15
1.0	23
1.5	35
2.0	52
2.5	70
3.0	72
3.5	114
4.0 and more	135

TABLE I

FLOOD DAMAGE SUMMARY
STANDARD PROJECT FLOOD
GUADALUPE RIVER AND ADJACENT STREAMS
(Guadalupe River & Coyote Creek)

DAMAGE CATEGORY	Reach 1	Reach 2	Reach 3	Reach 4	TOTAL
		Net Acres			
ential	1,560	51	1,588	206	3,405
rcial	610	61	817	923	2,411
	153	186	286	4,772	5,397
Utilities	106	12	43	50	211
Lands	1,002	39	429	529	1,999
ltural	5,657	165	140	3,445	9,407
onds	-	-	-	9,231	9,231
s & Sidewalks	1,425	11	960	500	2,896
ys	520	13	243	315	1,091
ads	111	20	118	40	289
ns	329	397	158	660	1,544
AL	11,473	955	4,782	20,671	37,881
		Market Values - $1,000			
ential	294,315	3,977	256,792	34,110	589,194
rcial & Industrial	178,631	7,414	244,869	148,211	579,125
	45,068	7,225	82,994	296,513	431,800
Utilities	26,528	1,473	12,863	13,587	54,451
Lands	19,173	614	9,015	6,879	35,681
ltural	48,937	1,736	1,825	50,857	103,355
onds	-	-	-	10,307	10,307
s & Sidewalks	152,835	1,155	100,800	52,500	307,290
ys	55,813	1,365	25,515	33,075	115,768
ads	11,881	2,100	16,590	4,150	34,721
s	17,635	20,832	8,295	34,650	81,412
s	2,100	3,675	13,650	-	19,425
AL	852,916	51,566	773,208	684,839	2,362,529
		Damages - $1,000			
ntial	14,503	370	17,951	2,399	35,223
cial & Industrial	3,134	643	12,320	5,258	21,355
	2,141	139	6,224	7,970	16,478
Utilities	1,612	55	312	343	2,322
Lands	373	13	218	268	872
ltural	1,664	69	59	957	2,749
onds	-	-	-	6,222	6,220
s & Sidewalks	1,524	12	1,008	525	3,069
ys	2,027	264	465	1,328	4,082
ads	305	421	2,252	316	3,291
s	352	418	166	694	1,628
s	525	1,963	3,308	-	5,801
AL	28,160	4,367	44,283	26,280	103,090

- All values are based on January 1974 market values & replacement costs.
- Reach 1 and Reach 2 are Coyote Creek and overflow area, Reach 3 is on Guadalupe River and Reach 4 is the common floodplain.

TABLE 2

FLOOD DAMAGE SUMMARY
100-YEAR FLOOD
GUADALUPE RIVER AND ADJACENT STREAMS
(Guadalupe River & Coyote Creek)

D DAMAGE CATEGORY	Reach 1	Reach 2	Reach 3	Reach 4	TOTAL
			Net Acres		
dential	953	40	193	58	1,244
erical & Industrial	391	55	201	900	1,547
ic	107	174	56	3,637	3,974
ic Utilities	80	11	34	29	154
nt Lands	354	34	33	529	950
cultural	3,221	161	-	3,184	6,566
Ponds	-	-	-	9,242	9,242
ets & Sidewalks	446	10	155	125	736
ways	243	5	88	169	505
roads	27	8	17	37	89
ams	256	397	154	660	1,467
OTAL	6,078	895	931	18,570	26,474
			Market Values - $1,000		
dential	182,535	3,111	27,651	3,588	216,885
erical & Industrial	138,373	6,641	54,942	135,885	335,841
ic	23,674	6,626	6,983	274,954	312,237
ic Utilities	22,421	1,328	7,083	6,174	37,006
nt Lands	15,145	536	1,825	6,879	24,385
cultural	28,006	1,691	-	44,420	74,117
Ponds	-	-	-	10,312	10,312
ets & Sidewalks	46,830	1,050	16,275	13,125	77,280
ways	25,515	525	9,240	17,745	53,025
roads	2,835	840	1,785	3,885	9,345
ams	13,440	20,832	8,085	34,650	77,007
ges	2,000	3,675	13,650	-	19,325
TAL	500,774	46,855	147,519	551,617	1,246,765
			Damages - $1,000		
dential	10,780	335	681	908	12,704
ercial & Industrial	2,031	620	1,054	2,865	6,570
ic	913	125	1,258	7,332	9,628
ic Utilities	1,366	50	133	251	1,800
nt Lands	90	10	9	223	332
cultural	1,135	67	-	578	1,780
Ponds	-	-	-	6,221	6,221
ets & Sidewalks	468	10	163	131	772
vays	1,184	263	92	509	2,048
oads	237	420	724	315	1,696
ams	269	417	162	693	1,541
ges	500	1,943	3,098	-	5,541
TAL	18,973	4,260	7,374	20,026	50,633

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1. All values are based on January 1974 market values and replacement costs.
2. Reach 1 and Reach 2 are Coyote Creek and overflow area, Reach 3 is on Guadalupe River and Reach 4 is the common floodplain.

DEPTH OF FLOODING
for
STANDARD PROJECT FLOOD
on
GUADALUPE RIVER & COYOTE CREEK

NOTES:

1) INUNDATED AREAS ARE BOUNDED BY ZERO DEPTH LINES A DEPTHS OF FLOODING IN FEET ARE SHOWN WITHIN THESE AREAS. DEPTHS OMITTED IN AREAS WHERE EXCESSIVE DEPTHS AND CONCURRENT FLOODING OCCUR.

2) ARROW VALUES ARE OVERLAND FLOWS IN C.F.S.

FIG.-1

DEPTH OF FLOODING
for
100 YEAR FLOOD
on
GUADALUPE RIVER & COYOTE CREEK

NOTES:

1) INUNDATED AREAS ARE BOUNDED BY ZERO DEPTH LINES AN DEPTHS OF FLOODING IN FEET ARE SHOWN WITHIN THESE AREAS. DEPTHS OMITTED IN AREAS WHERE EXCESSIVE DEPTHS AND CONCURRENT FLOODING OCCUR.

2) ARROW VALUES ARE OVERLAND FLOWS IN C.F.S.

FIG.-2

DEPTH OF FLOODING
for
STANDARD PROJECT FLOOD
on
GUADALUPE RIVER & COYOTE CREEK

FIG.-1A

DEPTH OF FLOODING
for
100 YEAR FLOOD
on
GUADALUPE RIVER & COYOTE CREEK

FIG.-2A